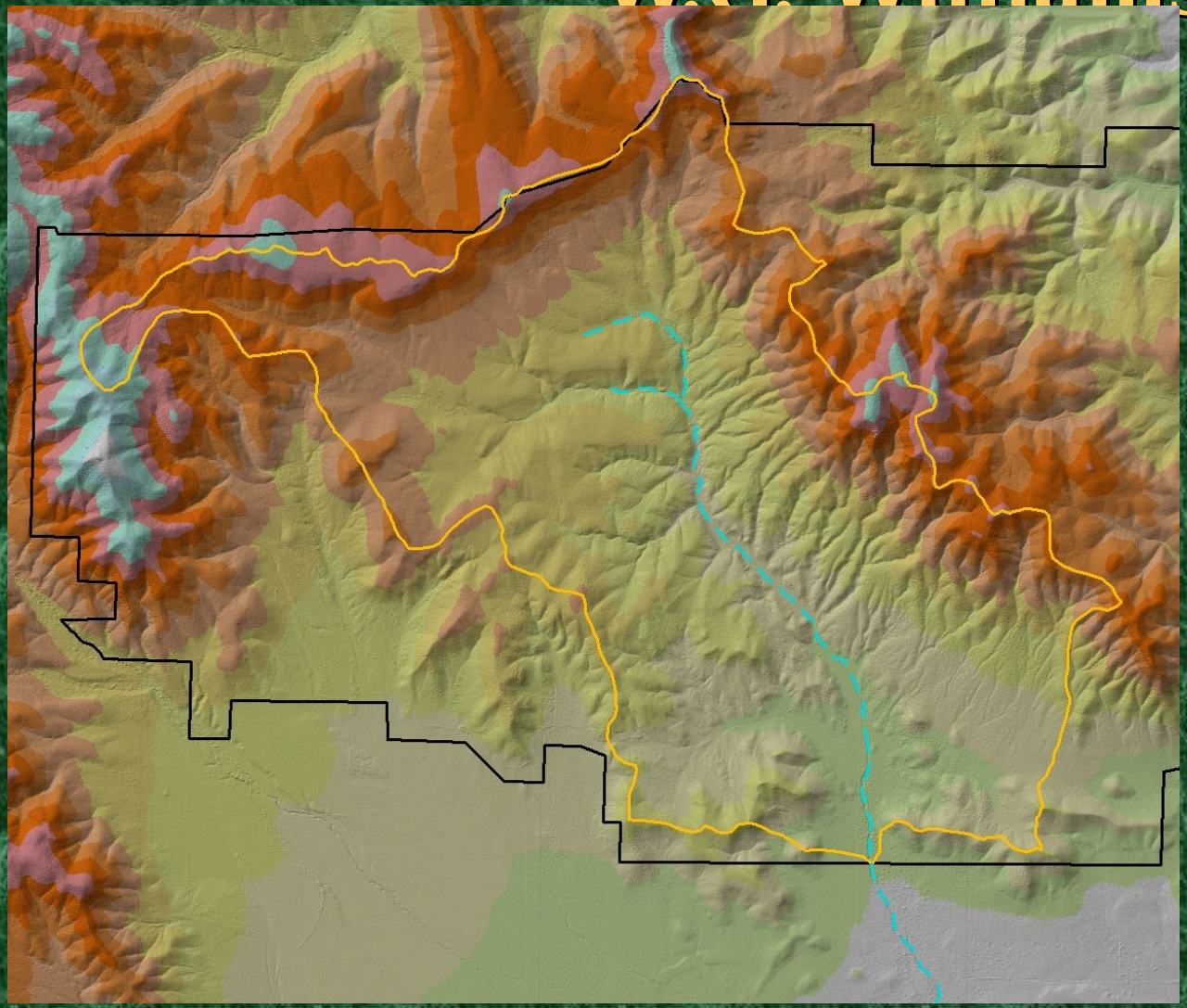
Mystery at Tickville Gulch - Camp W.G. Williams



Kevin Bartsch
and
Douglas Johnson

Acknowledgement

Brian Zalewsky

Jim Dobrowski

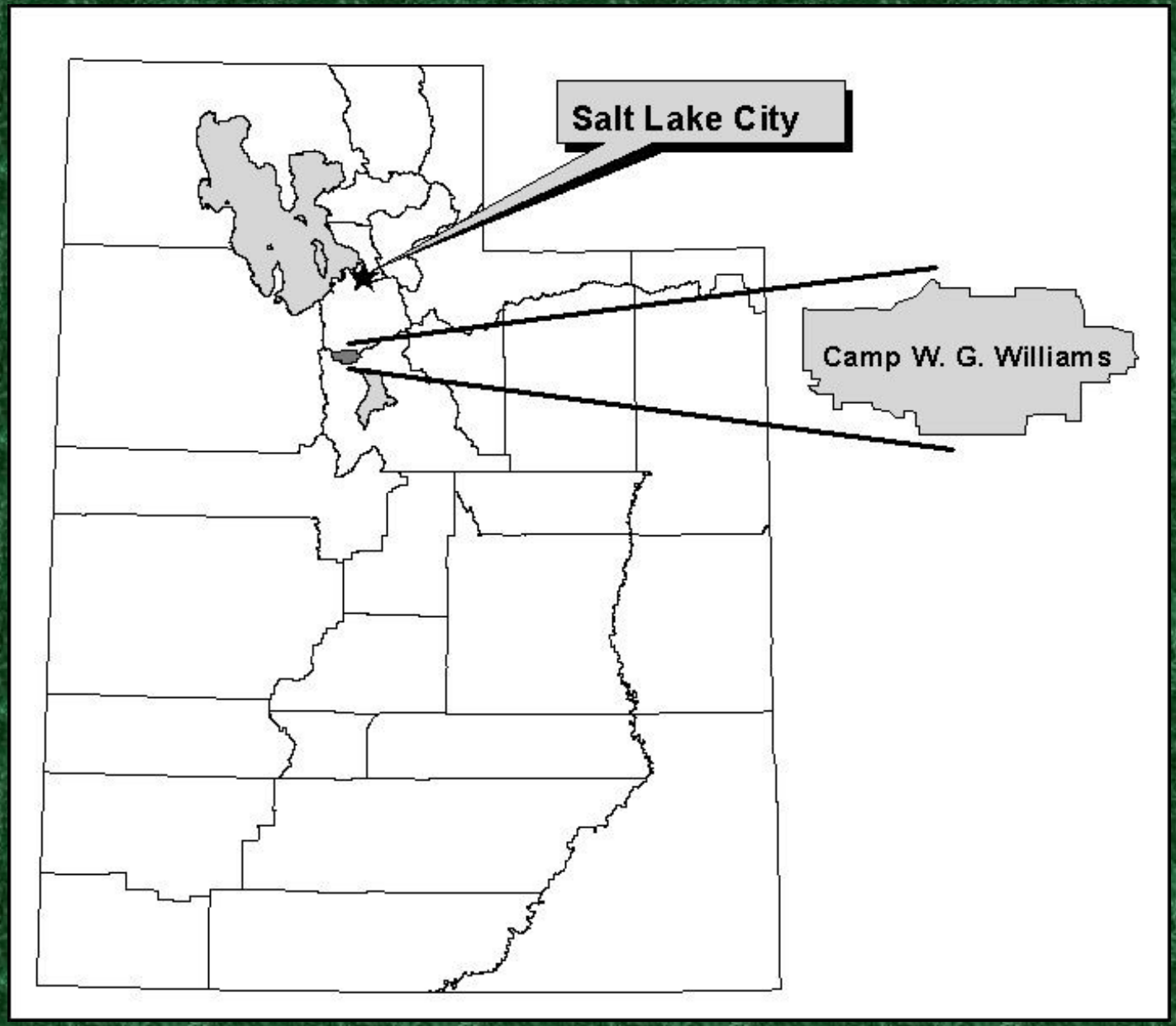
Jack Schmidt

Jim Long

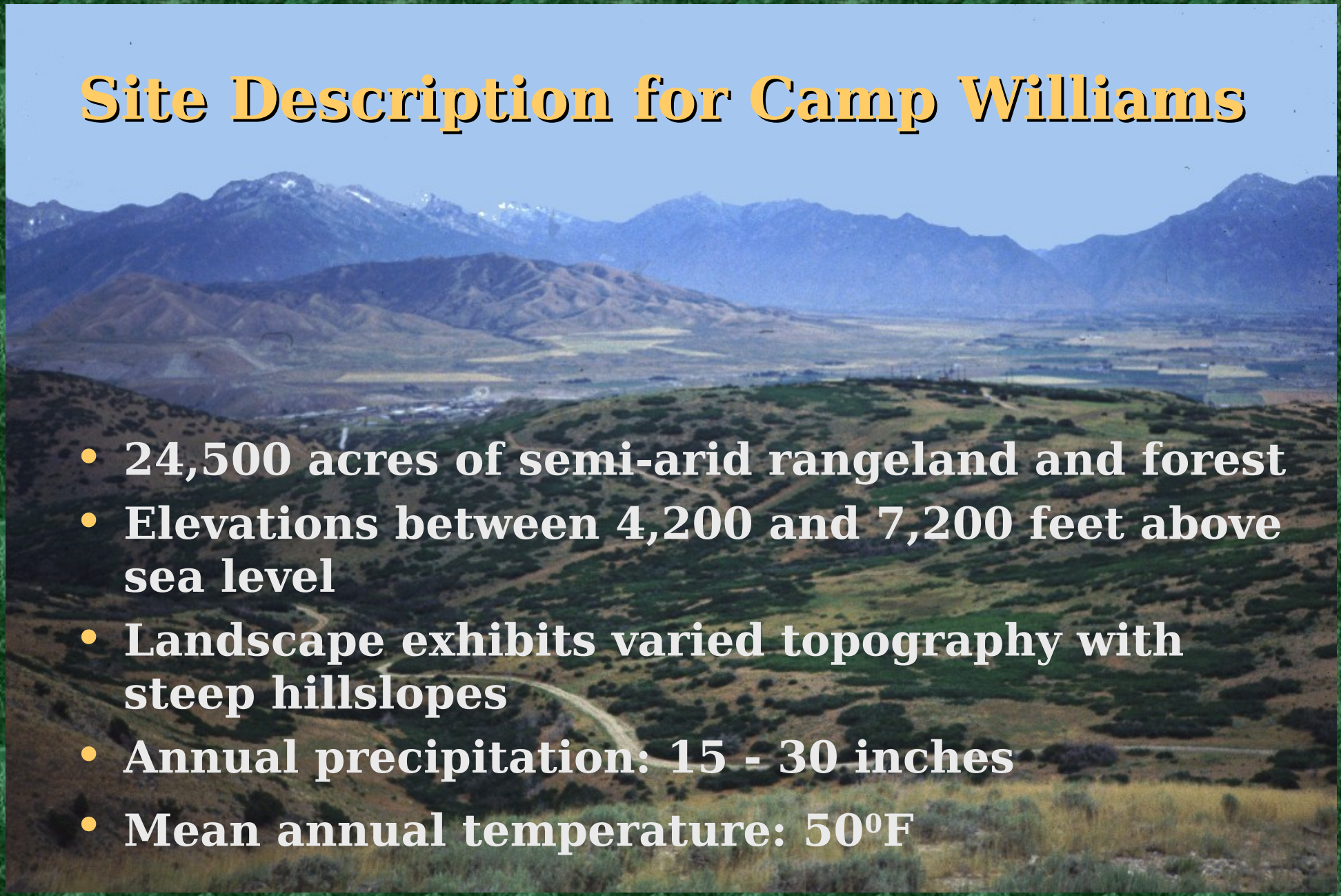
John Crane

Frank Dougher

Location of Camp Williams

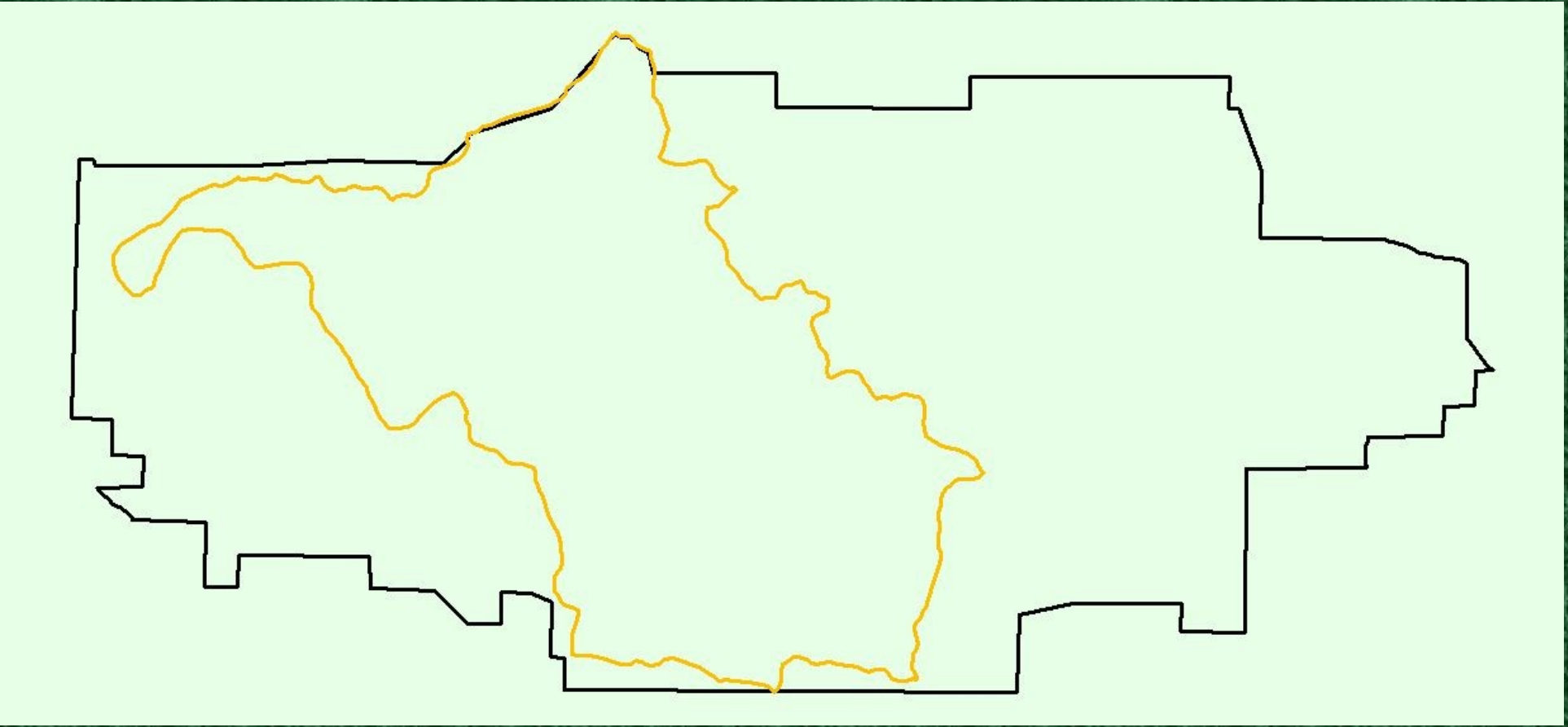


Site Description for Camp Williams

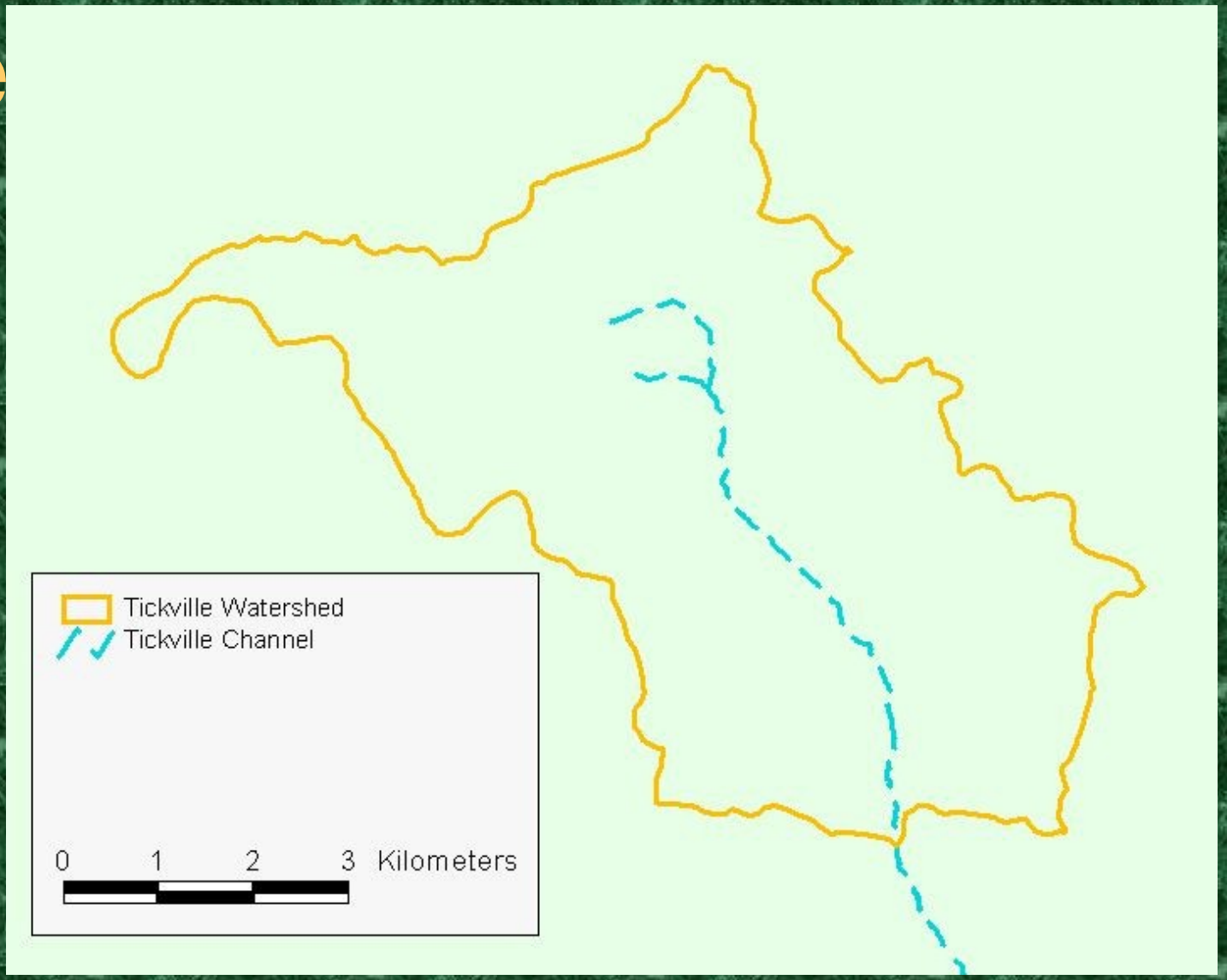


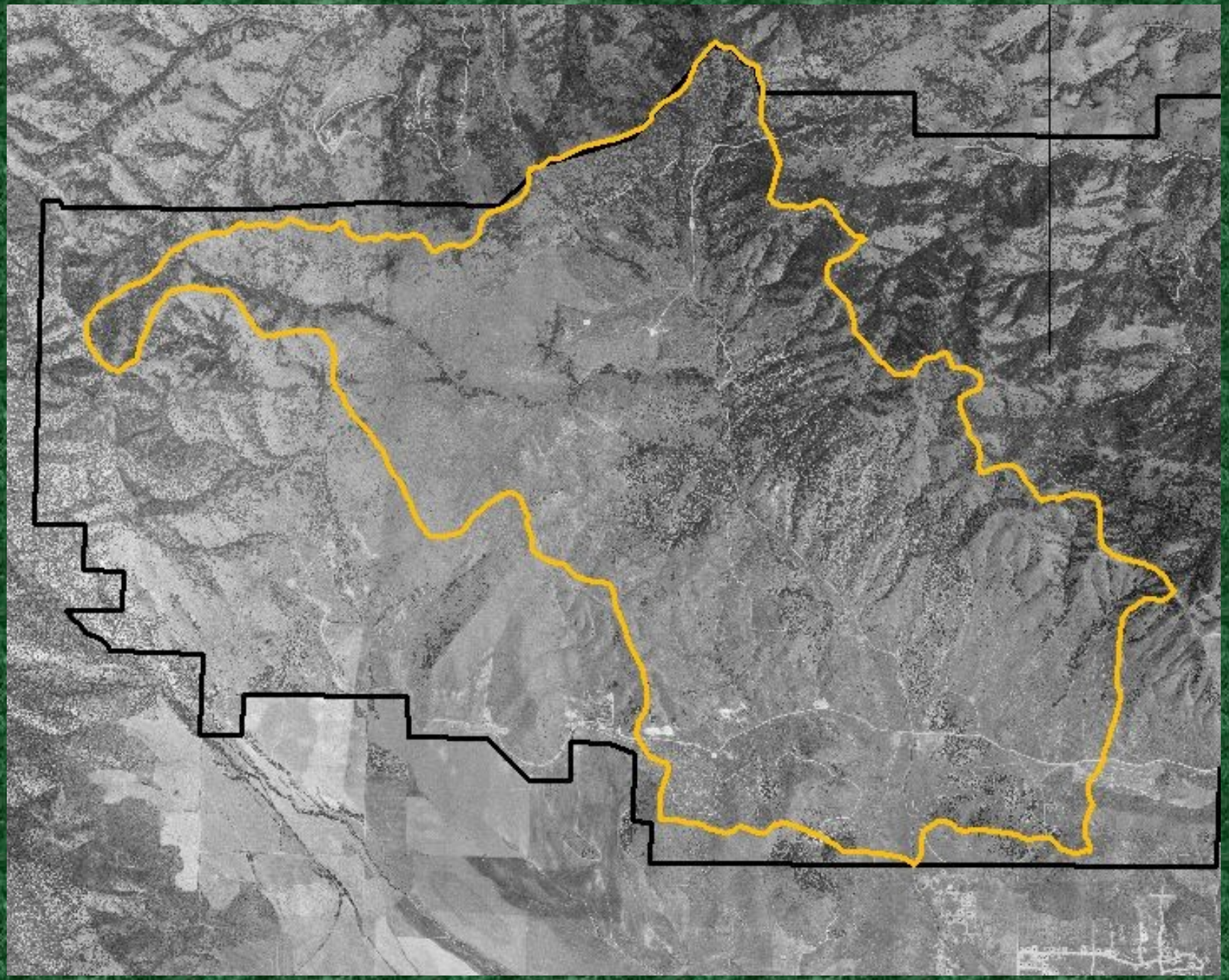
- 24,500 acres of semi-arid rangeland and forest
- Elevations between 4,200 and 7,200 feet above sea level
- Landscape exhibits varied topography with steep hillslopes
- Annual precipitation: 15 - 30 inches
- Mean annual temperature: 50ºF

Tickville Watershed within Camp Williams

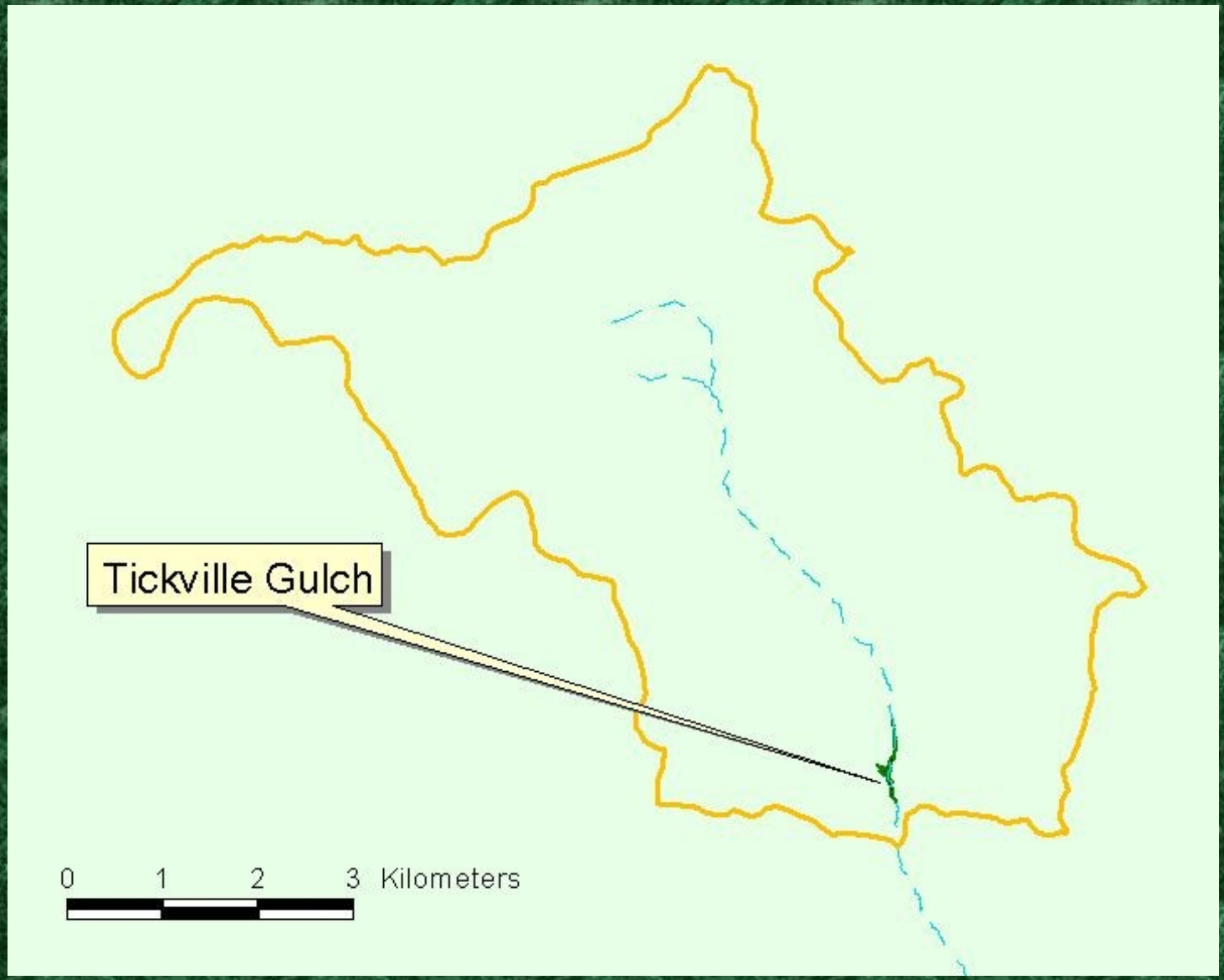


Tickville Watershed

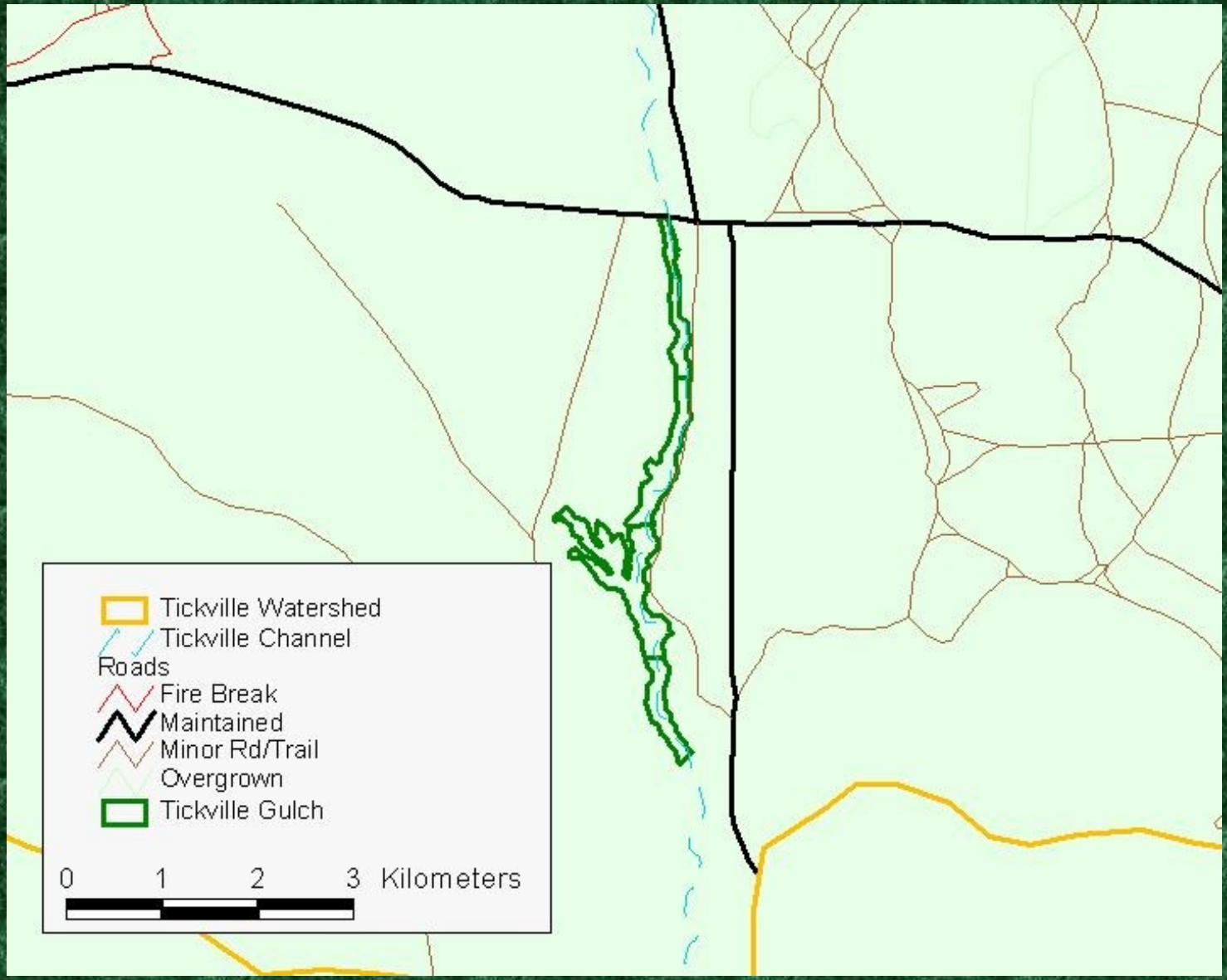




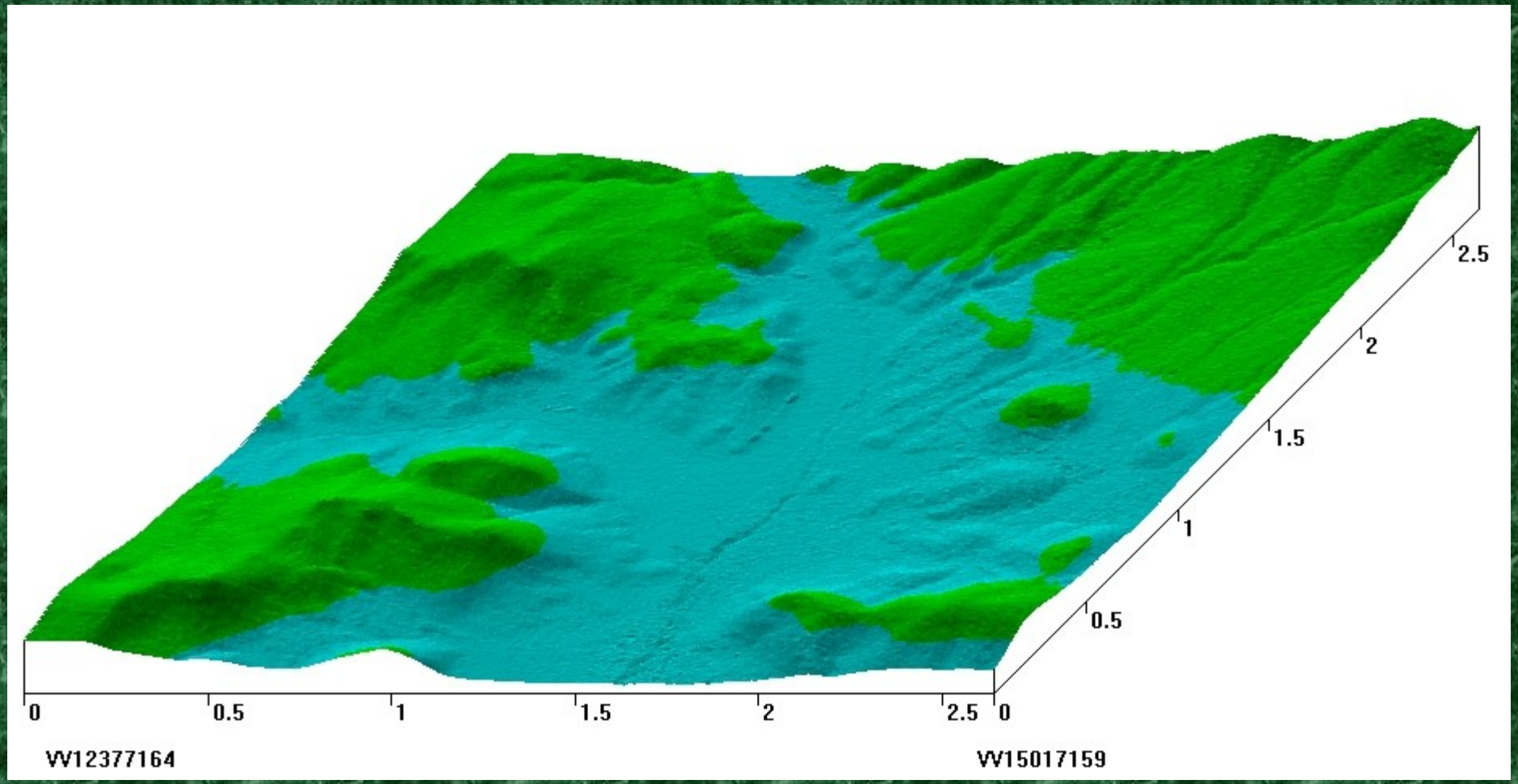
Location of Gulch



Gulch Detail



Overview



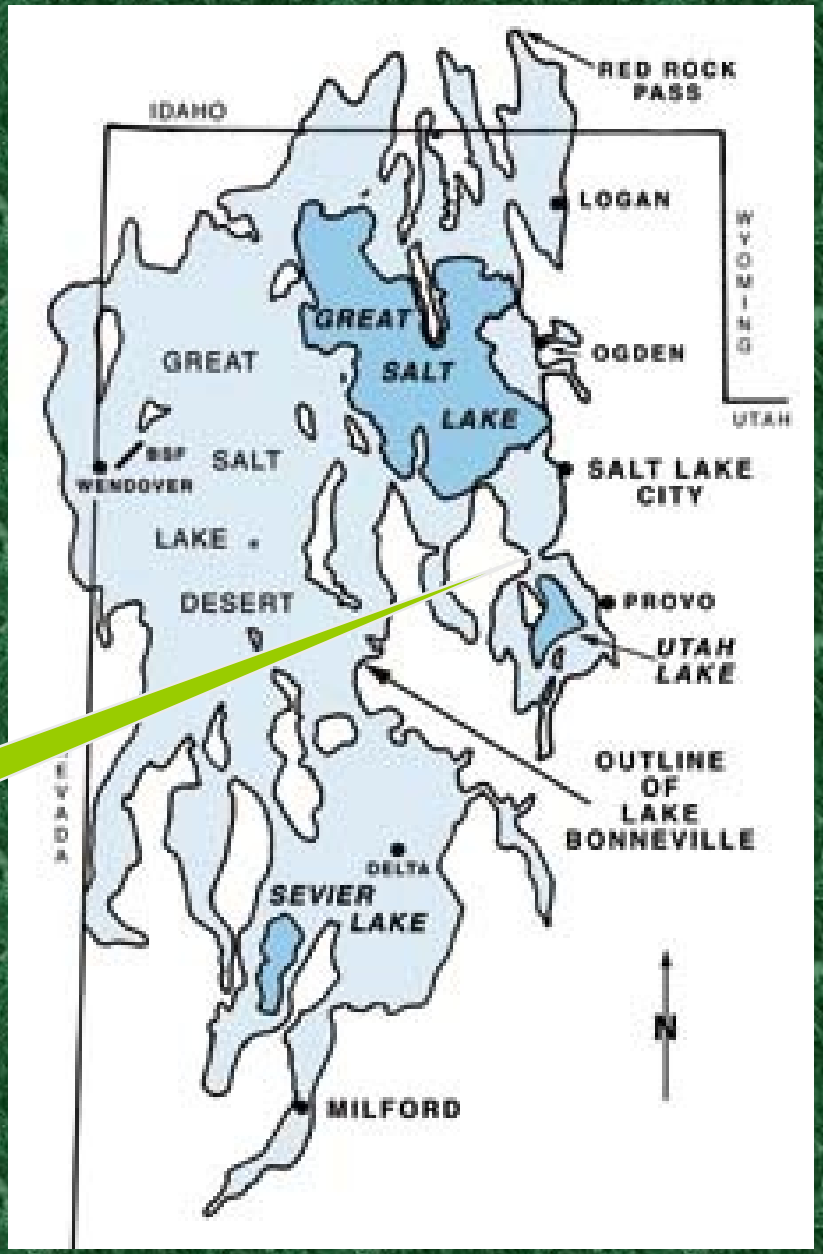
The Mystery???

- Why is there a gulch?
- Is it going to get worse?

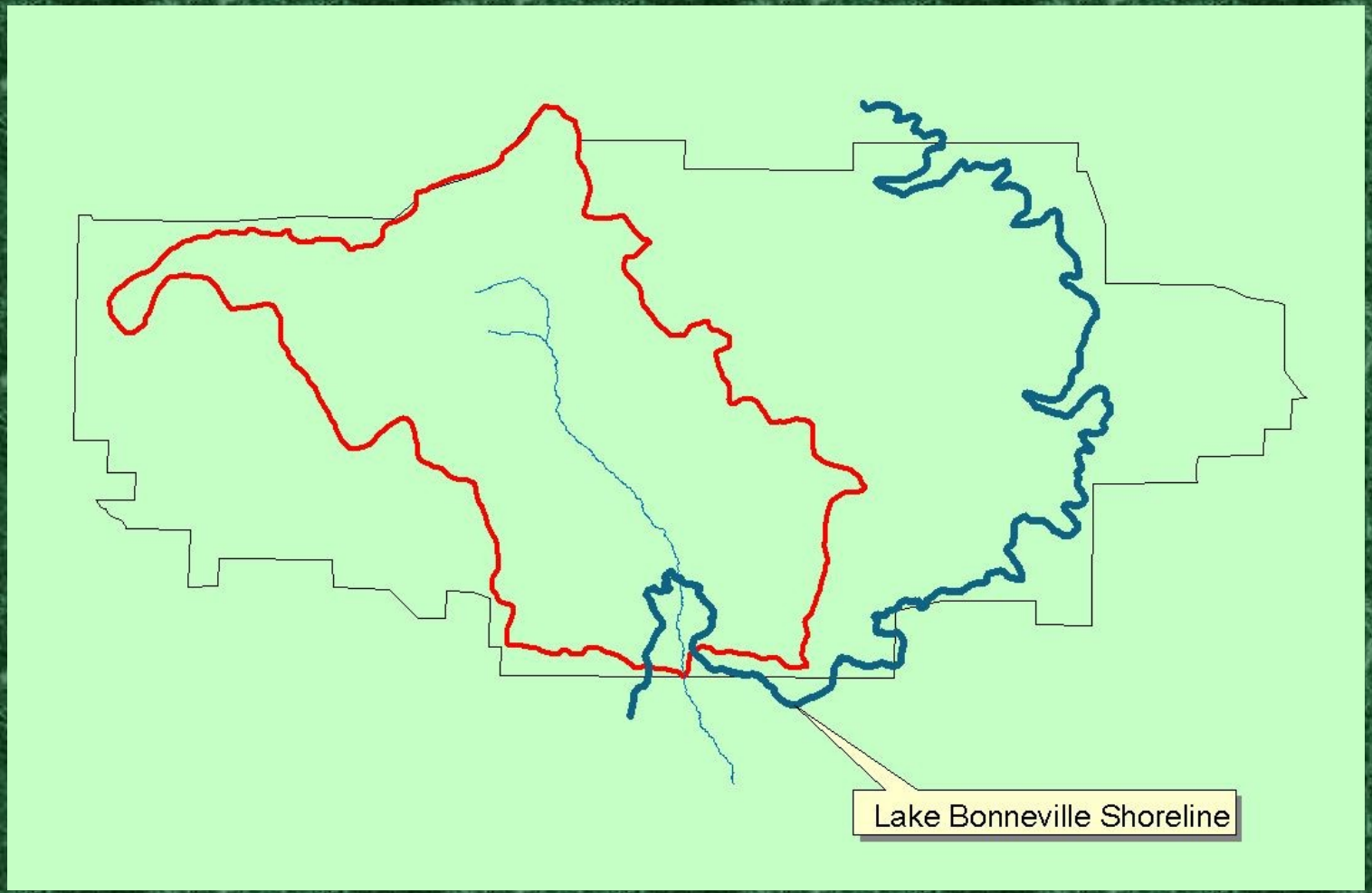
Ancient Lake Bonneville

17,000 years ago

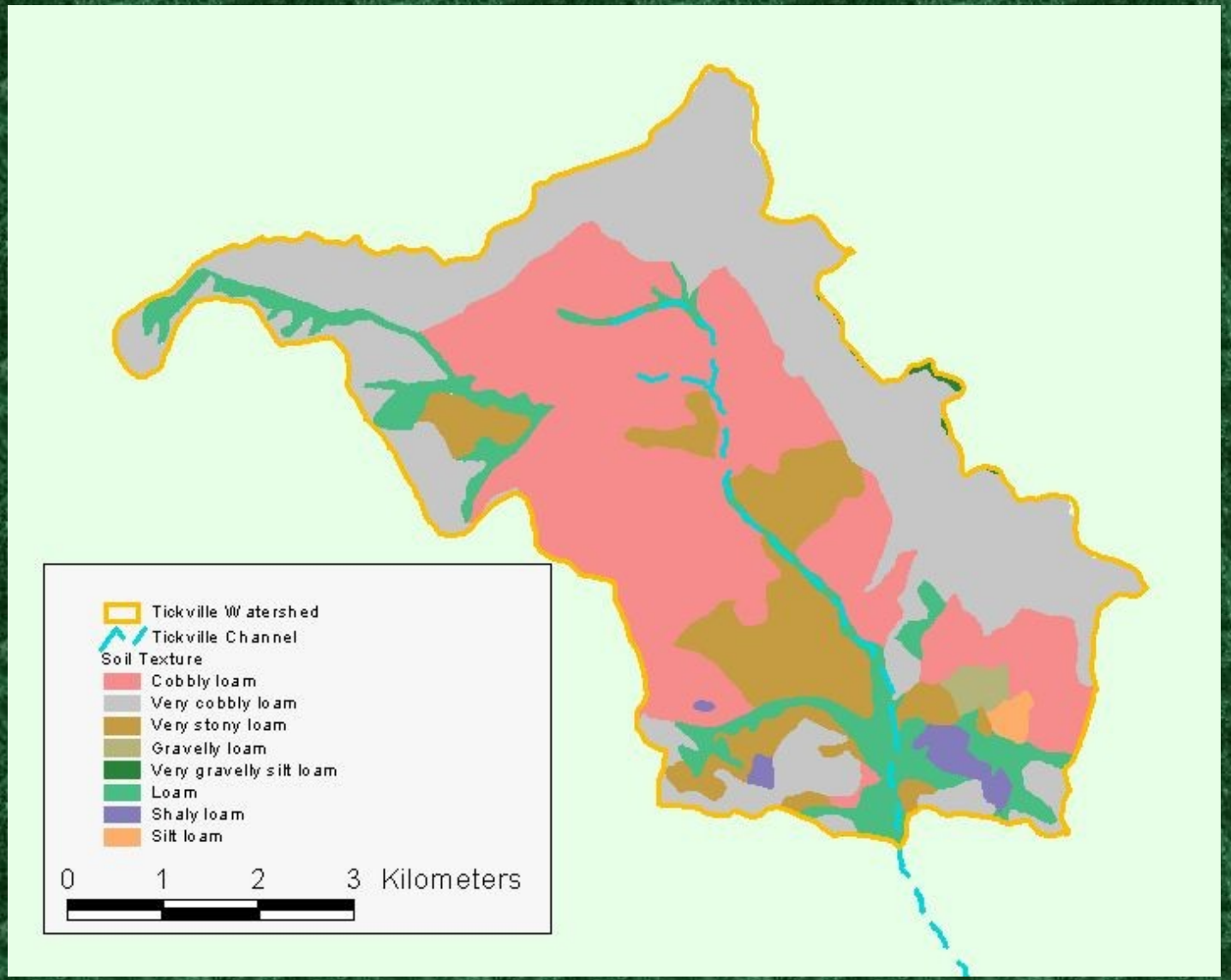
Camp Williams



Lake Bonneville Shoreline



Tickville Soils

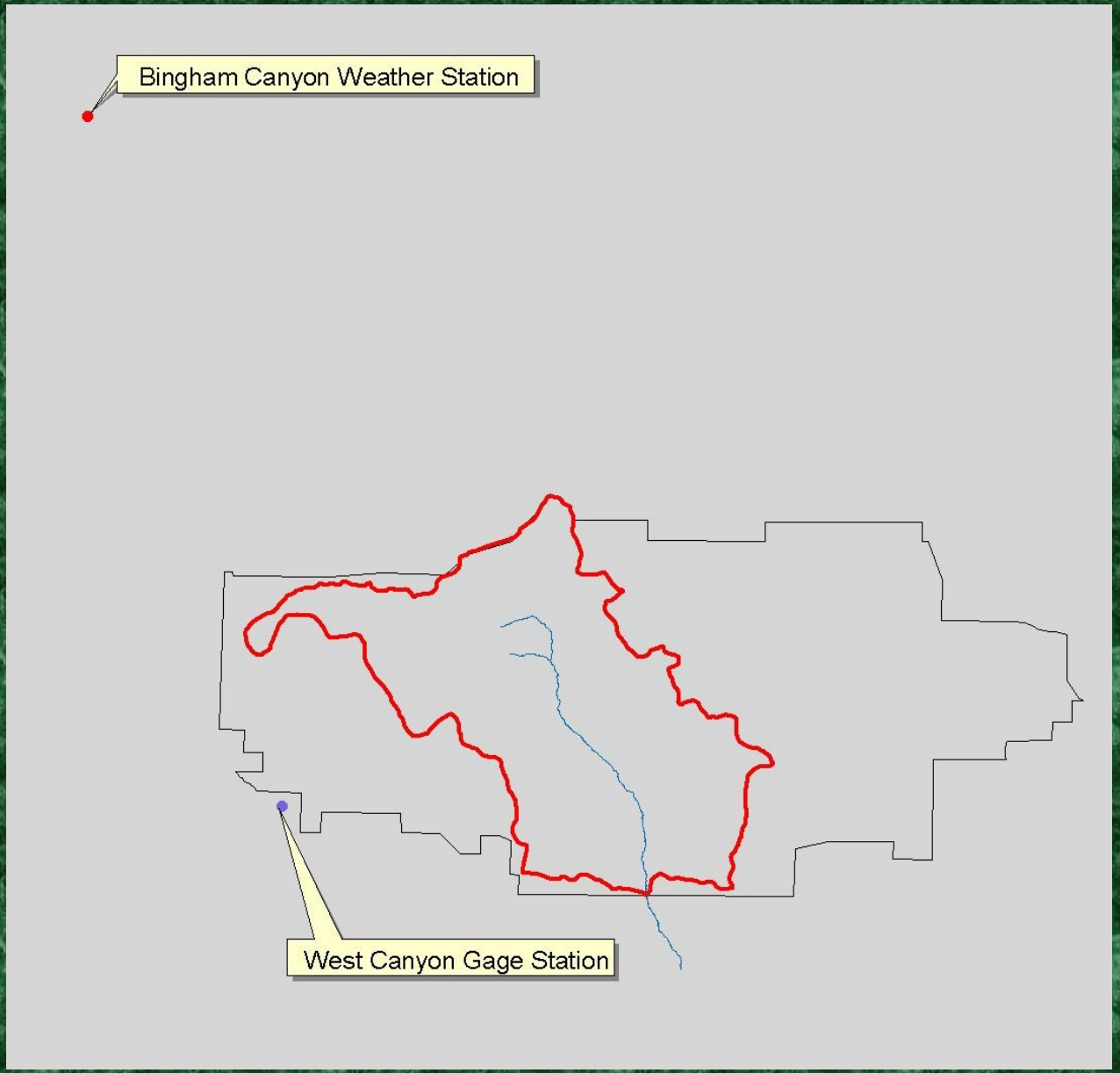


Depositional Layers

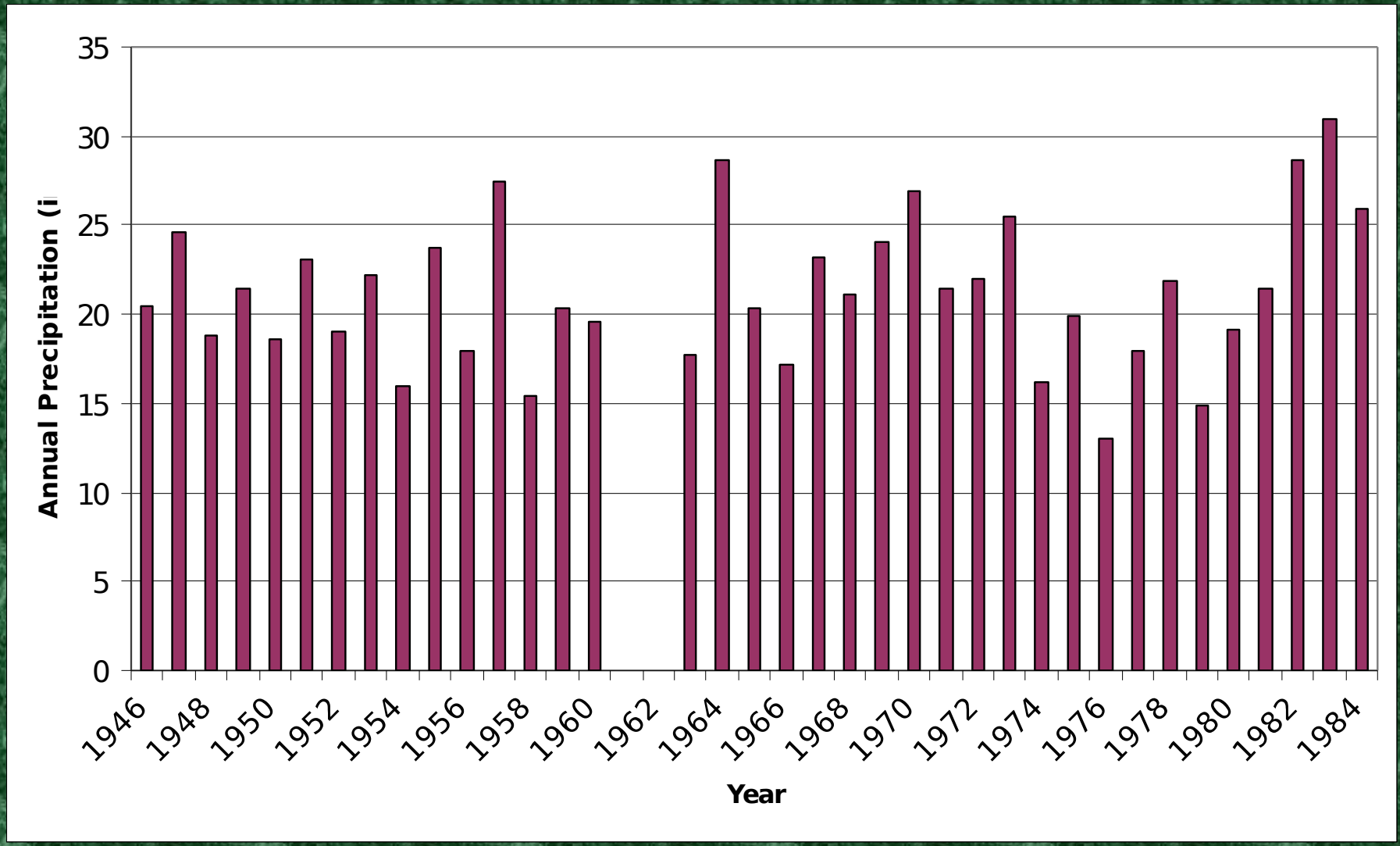
Steel Can

Can in Profile

Recent Storm and Flow Data



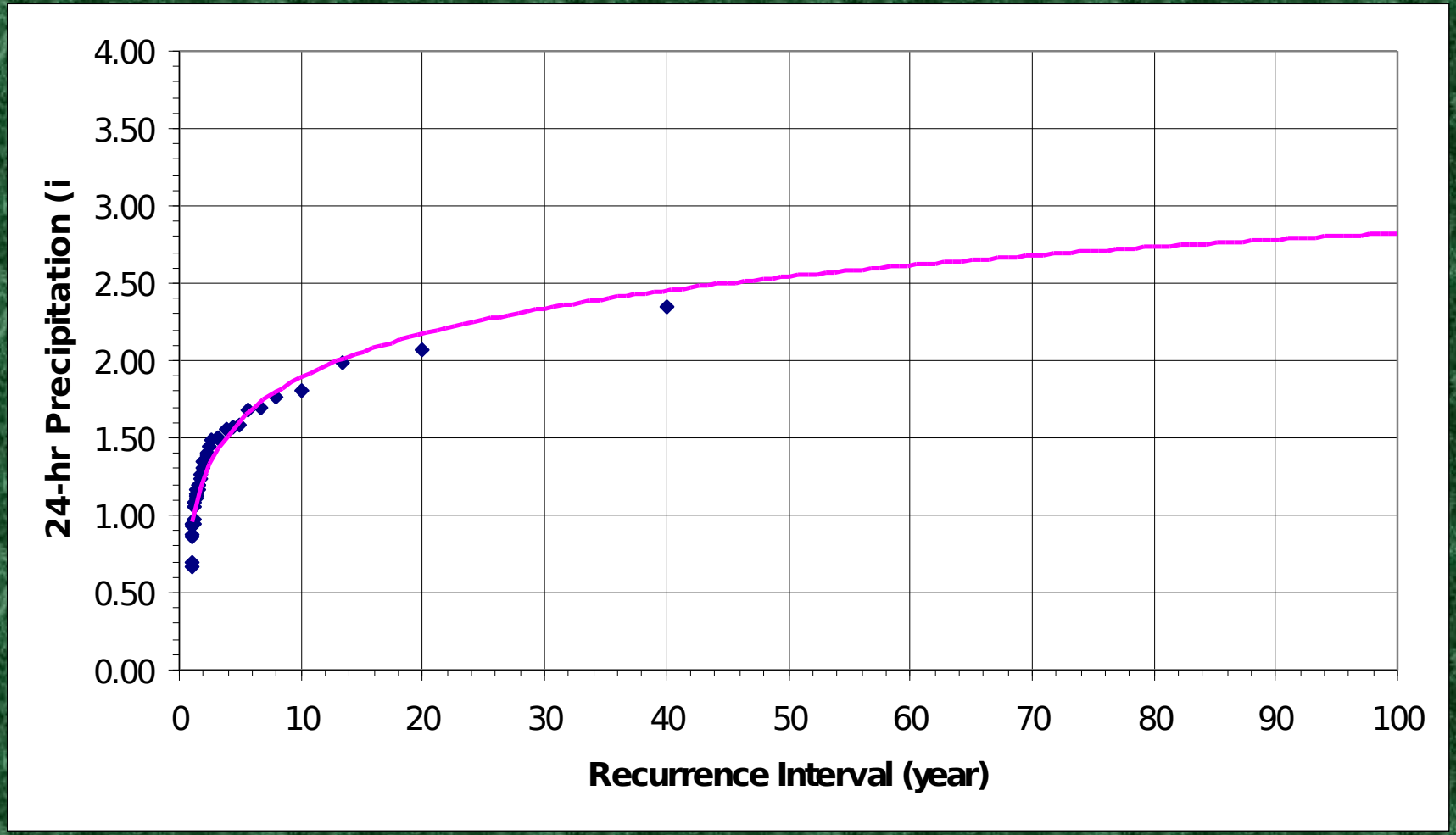
Annual Precipitation



May 1995

May 1996

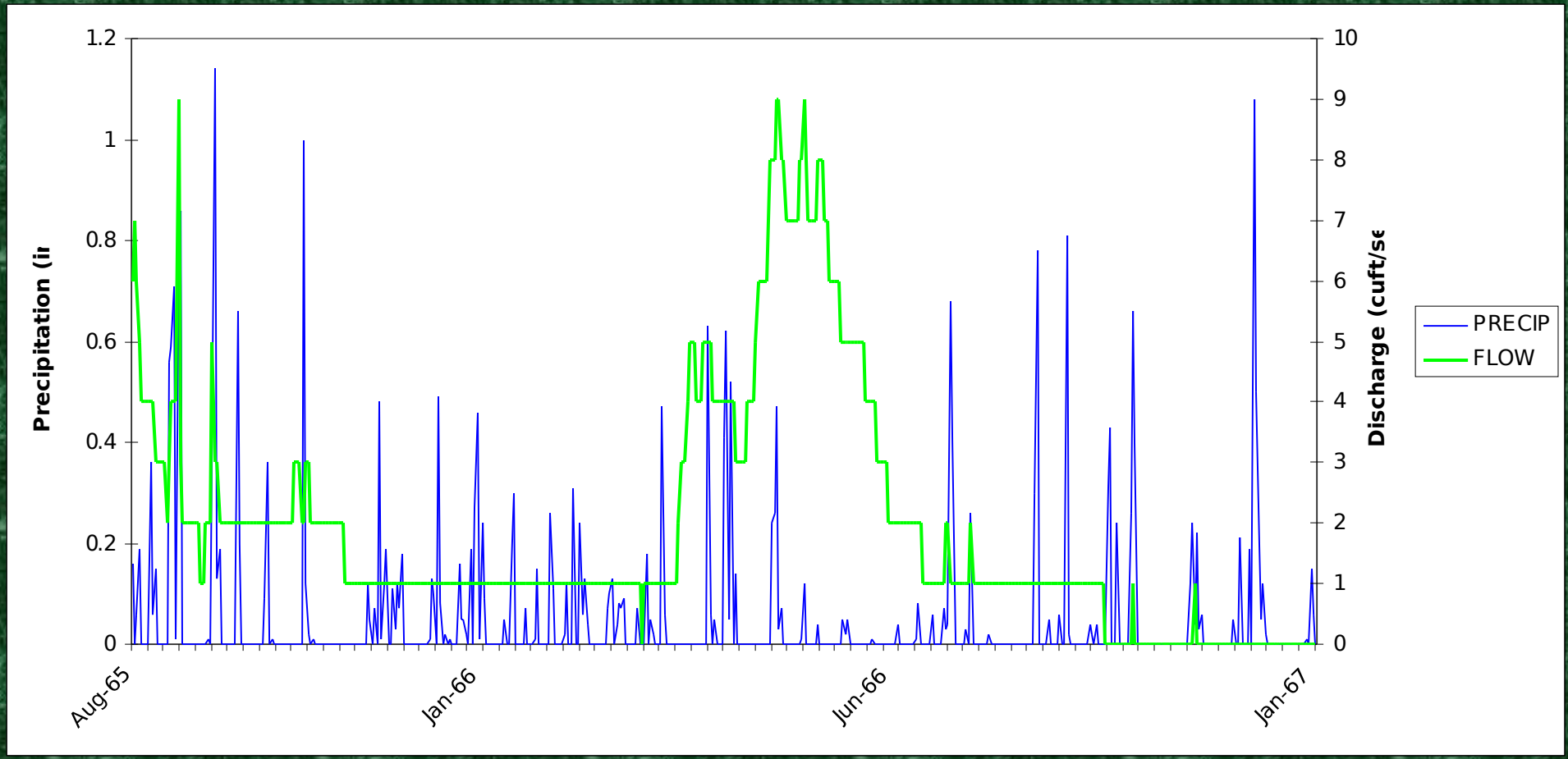
Precipitation Return Interval



Summary of Storm Data

- 20 year storm: 2.07 inches
- 40 year storm: 2.35 inches
- 50 year storm: 2.6 inches (projected)
- 100 year storm: 2.8 inches (projected)

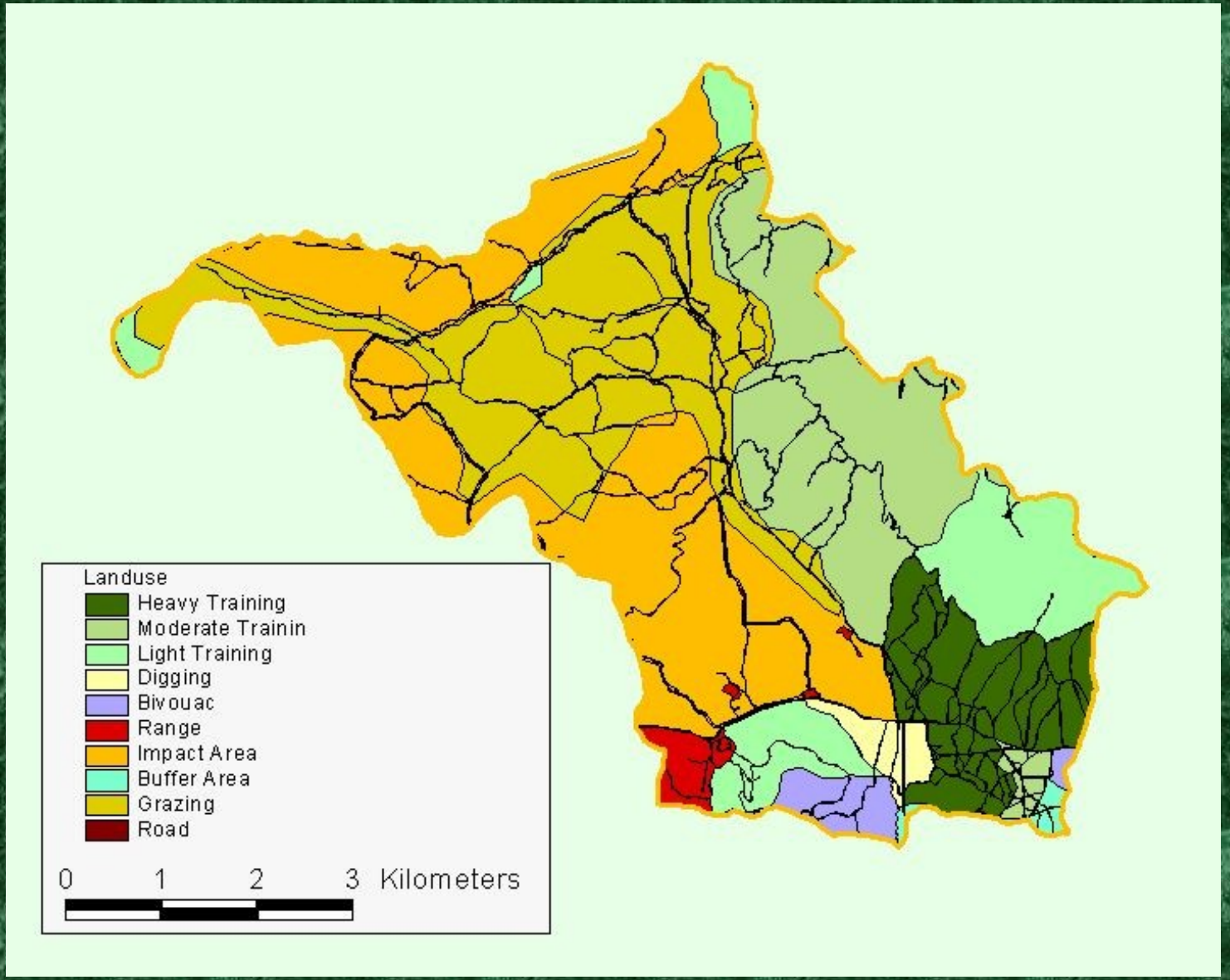
West Canyon Discharge



Infiltration Terminology

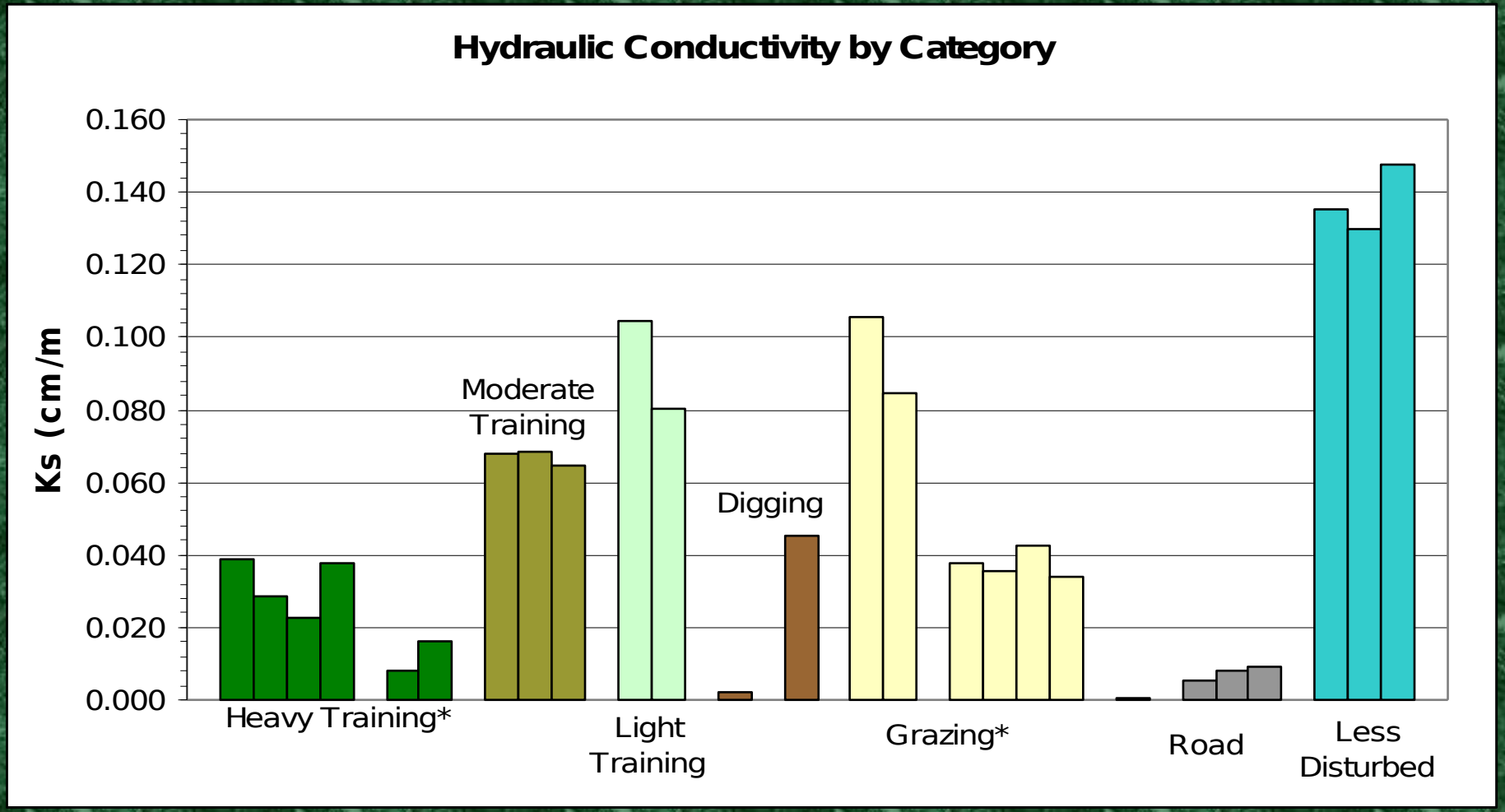
- Infiltration – the entry of water into the soil surface
- Percolation – the movement of water through the soil
- Runoff – the movement of water overland

Landuse


Landuse
Heavy Training
Moderate Trainin
Light Training
Digging
Bivouac
Range
Impact Area
Buffer Area
Grazing
Road
0
1
2
3 Kilometers

Drip Infiltration

Drip Infiltration Results



Infiltration by Landuse

Landuse	Area (ac)	Infiltration (cm/min)
Light Training	1012.9	0.092
Moderate Training	1632.4	0.067
Heavy Training	805.2	0.032 / 0.012
Bivouac	189.3	0.032
Range	134.5	0.032
Impact Area	2630.4	0.137
Digging	131.5	0.016
Grazing	2204.2	0.095 / 0.037
Road	254.0	0.005

Runoff by Landuse (100 year Storm)

Landuse	Area (ac)	Total Runoff (ft^3 * 10^7)
Light Training	1012.9	0
Moderate Training	1632.4	0
Heavy Training	805.2	185.0
Bivouac	189.3	0
Range	134.5	0
Impact Area	2630.4	0
Digging	131.5	23.3
Grazing	2204.2	0
Road	254.0	188.7

Rainfall Simulation on Roads

Rainfall Simulation on Roads

- Three Plots – 8 m by 25 m
- Slopes of plots: 5.4%, 7.6%, and 15.1%
- One dry and one wet simulation for each plot
- Thirty minute rain storm for each simulation
- Maximum intensity: 63.5 mm/hr

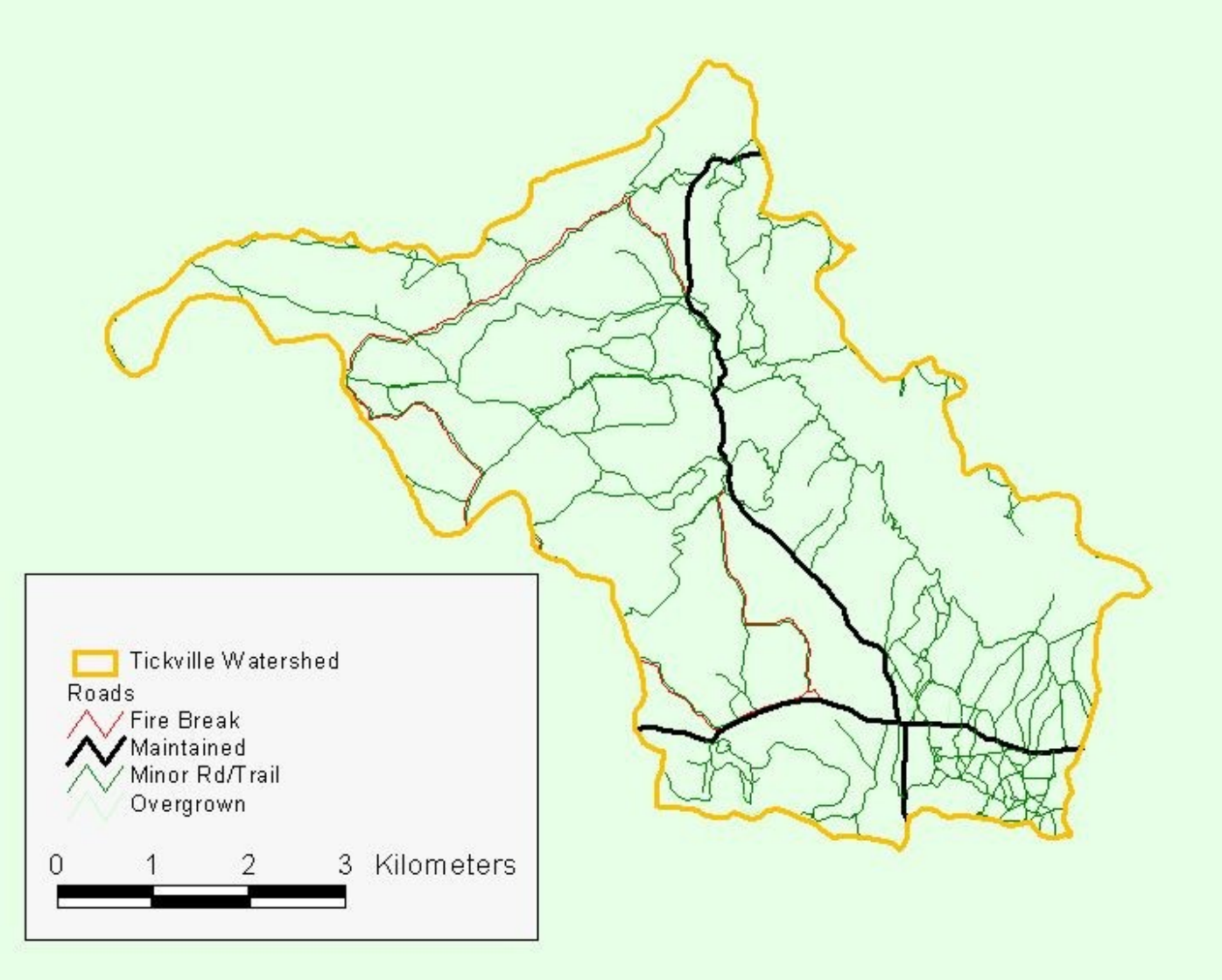
From: Zalewsky 1998

Rainfall Simulation Results

- 19.3 mm to 31.8 mm rainfall per simulation
- Overland flow started in one to two minutes
- 17.3 mm to 29.8 mm runoff per simulation
- 89.2% to 96.7% of the rain became runoff
- Up to 15.8 kg/m^2 erosion in a single simulation

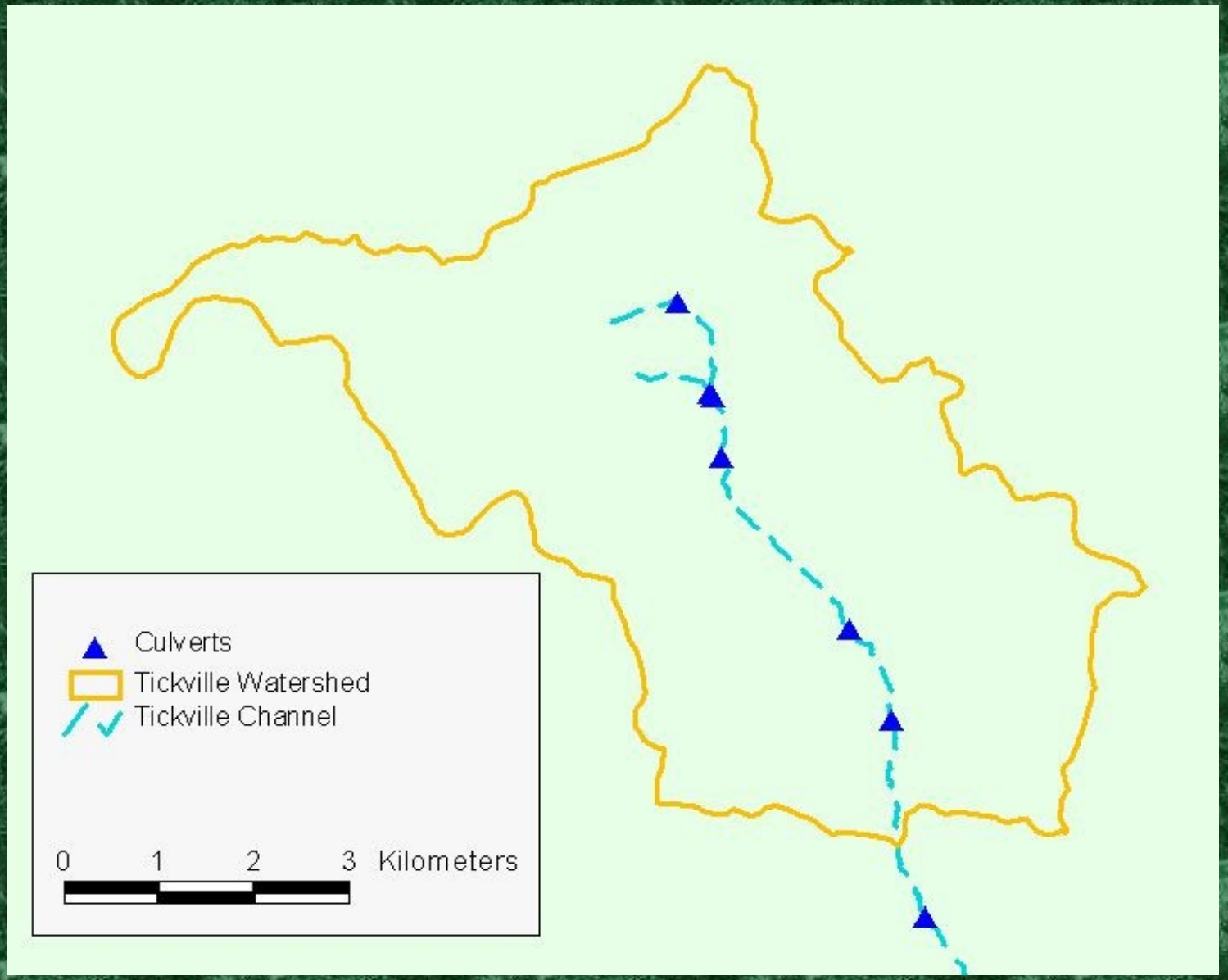
From: Zalewsky 1998

Tickville Roads



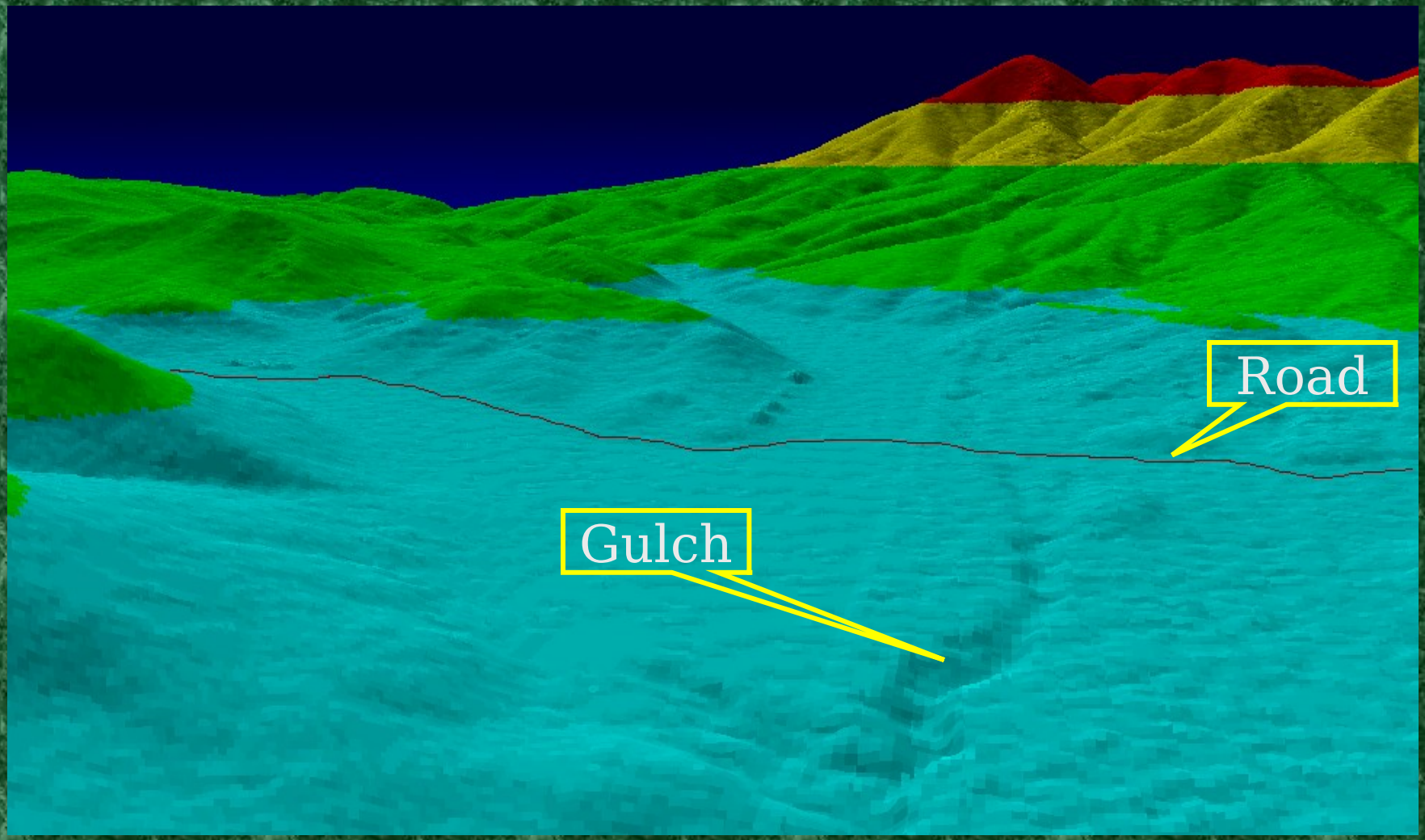
'12'21 P

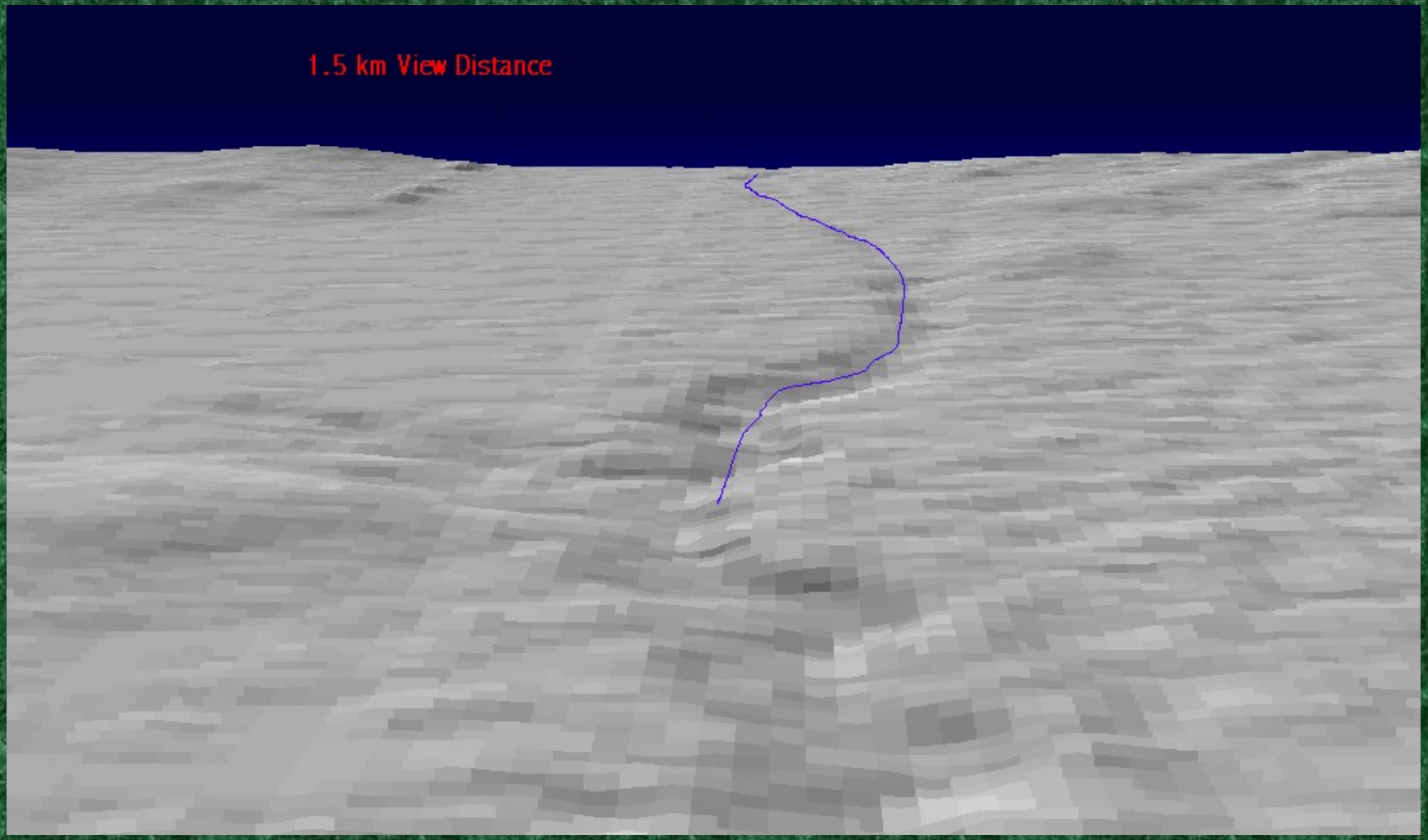
Culverts


Culverts
Tickville Watershed
Tickville Channel
0
1
2
3
Kilometers

Result of 0.26 inch rain storm in 1 hour

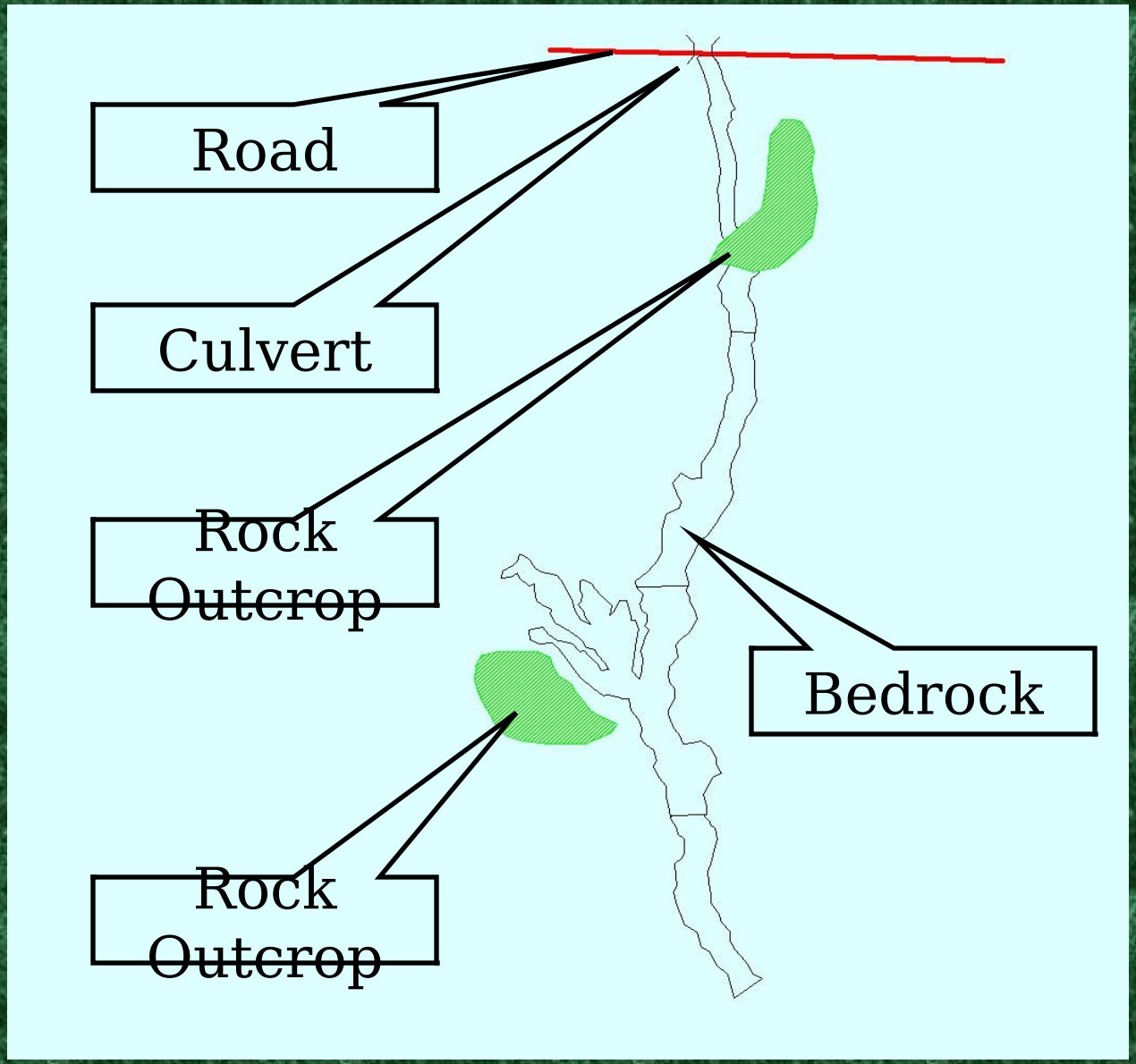
Channel Modification





Mostly straight channel with no natural meander

The Influence of Bedrock



6
5
4

The Mystery

- Why is there a gulch?
  - Watershed condition
  - Channel modification
- Is it going to get worse?
  - Perhaps some side gullies
  - Bedrock control in the main gulch

Questions?